

Appl. No. 10/733,690  
Amdt. Dated August 26, 2005  
Reply to Office Action of June 1, 2005

### **AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

#### **Listing of Claims:**

1. (currently amended) An energy absorbing plunging constant velocity joint comprising:

an outer joint part having an inner bore, a plurality of outer ball tracks, a normal axial range and an extended axial range;

an inner joint part having a convex guiding face, and a plurality of inner ball tracks;

a plurality of torque transmitting balls each guided in a corresponding pair of said outer and inner ball tracks;

a ball cage having an outer spherical face, an inner concave guiding face and a plurality of cage windows each accommodating one of said balls, the outer spherical face guided in contact by the inner bore of the outer joint part, and the inner concave guiding face guided in contact by the convex guiding face of the inner joint part, a center of curvature of the outer spherical face and center of curvature of the inner concave guiding face being offset from the center of the cage window in the axial direction to opposite sides holding said balls in a constant velocity plane; and

one or more energy absorption surfaces distal to the normal axial range and located in the extended axial range upon said outer joint part, wherein the energy absorption surface on the outer joint part interferes with at least one of the plurality of torque transmitting balls when said joint is operated beyond said normal axial range in the extended axial range, at least one of the energy absorption surfaces being a track surface having one or more tapers or a step taper.

2. (original) The joint according to claim 1, wherein one of the energy absorption surfaces is a circlip.

Appl. No. 10/733,690  
Amdt. Dated August 26, 2005  
Reply to Office Action of June 1, 2005

3. (original) The joint according to claim 2, wherein the circlip is made from a deformable material.

4. (original) The joint according to claim 3, wherein the deformable material is metal.

5. (original) The joint according to claim 3, wherein the deformable material is plastic.

6. (original) The joint according to claim 2, wherein the circlip is a ring.

7. (original) The joint according to claim 2, wherein the outer joint part further comprises a cylindrical open end located adjacent the extended axial range and distal to the normal axial range of the outer joint part and a grease cover sealingly attached to the cylindrical open end.

8. (original) The joint according to claim 7, wherein the grease cover is displaceable when the joint has axial travel beyond the extended axial range.

9. (currently amended) An energy absorbing plunging constant velocity joint comprising:

an outer joint part having an inner bore, a plurality of outer ball tracks, a normal axial range and an extended axial range;

an inner joint part having a convex guiding face, and a plurality of inner ball tracks;

a plurality of torque transmitting balls each guided in a corresponding pair of said outer and inner ball tracks;

a ball cage having an outer spherical face, an inner concave guiding face and a plurality of cage windows each accommodating one of said balls, the outer spherical face guided in contact by the inner bore of the outer joint part, and the inner concave guiding face guided in contact by the convex guiding face of the inner joint

Appl. No. 10/733,690  
Amdt. Dated August 26, 2005  
Reply to Office Action of June 1, 2005

part, center of curvature of the outer spherical face and center of curvature of the inner concave guiding face being offset from the center of the cage window in the axial direction to opposite sides holding said balls in a constant velocity plane; and

one or more energy absorption surfaces distal to said normal axial range and located in the extended axial range upon said outer joint part, wherein the energy absorption surface on the outer joint part interferes with said ball cage or with at least one of the plurality of torque transmitting balls when said joint is operated beyond the normal axial range in the extended axial range, wherein one of the energy absorption surfaces is a track surface having one or more tapers or a step taper.

10. (original) The joint according to claim 9, wherein one of the energy absorption surfaces is a bore surface.

11. (original) The joint according to claim 10, wherein the bore surface has one or more inclination, a stepped inclination or a variable inclination.

12. (original) The joint according to claim 10, wherein the bore surface is made from the same material piece as the outer joint part.

13. (cancelled)

14. (cancelled)

15. (currently amended) The joint according to claim ~~14~~ 9, wherein the track surface is made from the same material piece as the outer joint part.

16. (original) The joint according to claim 9, wherein the outer joint part further comprises a cylindrical open end located adjacent the extended axial range and distal to the normal axial range of the outer joint part and a grease cover sealingly attached to the cylindrical open end.

Appl. No. 10/733,690  
Amdt. Dated August 26, 2005  
Reply to Office Action of June 1, 2005

17. (original) The joint according to claim 16, wherein the grease cover is displaceable when the joint has axial travel beyond the extended axial range.

18. (currently amended) The joint according to claim 1 ~~and~~ or 9 having more than one energy absorption surface.

19. (currently amended) A propeller shaft assembly for a vehicle having an energy absorbing plunging constant velocity joint comprising:

an outer joint part having an inner bore, a plurality of outer ball tracks, a normal axial range and an extended axial range;

an inner joint part having a convex guiding face, and a plurality of inner ball tracks;

a plurality of torque transmitting balls each guided in a corresponding pair of said outer and inner ball tracks;

a ball cage having an outer spherical face, an inner concave guiding face and a plurality of cage windows each accommodating one of said balls, the outer spherical face guided in contact by the inner bore of the outer joint part, and the inner concave guiding face guided in contact by the convex guiding face of the inner joint part, center of curvature of the outer spherical face and center of curvature of the inner concave guiding face being offset from the center of the cage window in the axial direction to opposite sides holding said balls in a constant velocity plane;

one or more energy absorption surfaces distal to said normal axial range and located in the extended axial range upon said outer joint part, wherein the energy absorption surface on the outer joint part interferes with said ball cage or with at least one of the plurality of torque transmitting balls when said joint is operated beyond the normal axial range in the extended axial range, at least one of the energy absorption surfaces being a track surface having one or more tapers or a step taper;

a hollow shaft connected to said outer joint part; and

a connecting shaft connected to said inner joint part,

Appl. No. 10/733,690  
Amdt. Dated August 26, 2005  
Reply to Office Action of June 1, 2005

wherein the hollow shaft contains the connecting shaft, the inner joint part, the ball cage and the torque transmitting balls when said joint is operated beyond the extended axial range.

20. (original) The joint according to claim 19, wherein the outer joint part further comprises a cylindrical open end located adjacent the extended axial range and distal to the normal axial range of the outer joint part and a grease cover sealingly attached to the cylindrical open end, wherein the grease cover is displaceable when the joint has axial travel beyond the extended axial range.